

REMARKS

Applicant thanks the Examiner for the careful consideration given to this application. Reconsideration and allowance are now respectfully requested in view of the following remarks. Claims 1-46 are pending in this application. Claims 1, 10, 20, 21, 30, 34 and 43 are independent claims.

Claim Rejections Under 35 U.S.C. §103

Claims 1-5, 8 and 9 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 7,103,325 to Jia et al. (hereinafter “Jia”) in view of U.S. Patent Publication No. 2002/0132600 to Rudrapatna (hereinafter “Rudrapatna”) and in further view of U.S. Patent Publication No. 2004/0082356 to Walton et al. (hereinafter “Walton”). This rejection is respectfully traversed.

Applicant submits that the combination of Jia, Rudrapatna and Walton does not teach or suggest the combination of elements recited in claims 1-9. Independent claim 1, in part, recites “a multi-antenna signal processing circuit situated in a first access point and adapted to: operate simultaneously with a first baseband processor, so that said first baseband processor handles data transmissions in a first mode between said first access point and a second access point under a first channel transmission condition, and said multi-antenna signal processor handles data transmissions in a second mode between said first access point and said second access point under a second channel transmission condition.” The Office Action acknowledged that Jia fails to teach or suggest two modes operating simultaneously. So the Office Action cited Rudrapatna to cure this deficiency of Jia. Nevertheless, Jia also fails to teach or suggest other features, such as the multi-antenna signal processing circuit, recited in this element of claim 1.

Col. 2, lines 33-40 of Jia discloses selection of

a space-time encoding mode to use when transmitting with spatial diversity based on the receive diversity associated with a receiver device and the quality of the transmission channels based on information fed back from the receiver device. The selectable space-time encoding modes are preferably space-time transmit diversity encoding and a version of BLAST-type encoding. Further, modulation modes, error encoding rates, or a combination thereof, may also be based on the quality of the transmission channels and the available diversity of the receiver device. Information bearing in the correlation, or balance, of the various

transmission channels can also be fed back to the transmitter from the receiver device to assist in the selection of modulation modes and error encoding rates.

Col. 3, line 67-Col. 4, line 39 of Jia also discloses

The base station generally includes a control system, a baseband processor, transmit circuitry, receive circuitry, multiple antennas, and a network interface. The receive circuitry receives radio frequency signals through antennas bearing information from one or more remote transmitters provided by mobile terminals. The baseband processor processes the digitized received signal to extract the information or data bits conveyed in the received signal. This processing typically comprises demodulation, decoding, and error correction operations. As such, the baseband processor is generally implemented in one or more digital signal processors (DSPs). The received information is then sent across a wireless network via the network interface or transmitted to another mobile terminal serviced by the base station. On the transmit side, the baseband processor receives digitized data, which may represent voice, data, or control information, from the network interface under the control of control system, and encodes the data for transmission. The encoded data is output to the transmit circuitry, where it is modulated by a carrier signal having a desired transmit frequency or frequencies. The multiple antennas and the replicated transmit and receive circuitries provide spatial diversity.

The Office Action seems to equate the multiple antennas of Jia with the multi-antenna signal processing circuit recited in claim 1. The Office Action also seems to equate the baseband processor Jia with the first baseband processor recited in claim 1. Although Col. 2 of Jia discloses multiple modes, there is no teaching in Jia, however, that the multiple antennas handle “data transmissions in a second mode between said first access point and said second access point under a second channel transmission condition,” where the second mode is different from a first mode in which the baseband processor handles data transmission between the first and second access points. (underlining added) Instead Jia merely discloses that signals are received and transmitted from the base station through the multiple antennas.

Furthermore, Rudrapatna discloses an antenna array with two groups of antennas, where each group contains two pairs of antennas. See paragraph 0017. Rudrapatna further discloses that:

the first group of antennas has switches positioned to select either antennas in each of the antenna pairs. The selected antenna is thus activated by a signal present in path 130 corresponding to switch 120 or path 132 corresponding to switch 122. ... For example, a signal on path 138 causes switch 120 to be set to

position A or B and switch 122 to be set to position C or D. Signal source/control circuit 128 comprises well known signal processing, transmission and/or reception circuitry for generating similar or distinct signals (on paths 130, 132, 134 and 136) depending on the mode in which the groups are operating thereby activating the selected antennas. ... Signal source/control circuit 128 also comprises control circuitry which when operated causes switches 120, 122, 124 and 126 to be set to certain positions to operate the groups of antennas in either the beam forming/steering mode, the MIMO mode, the diversity mode or any combination thereof. See paragraph 0024 of Rudrapatna.

So, in Rudrapatna, the antenna array is configured to operate in either beam forming/steering mode, diversity mode, MIMO mode or any combination thereof. In Rudrapatna, the simultaneous operations of multiple modes are only applicable to the antenna array, not to processing of signals obtained from the antenna array. In the present invention, on the other hand, “the first baseband processor handles data transmissions in a first mode ... and said multi-antenna signal processor handles data transmissions in a second mode,” as recited in claim 1. So, in the present invention, the simultaneous operations are performed by the first baseband processor and the multi-antenna signal processor.

In the Response to Arguments section, the Office Action alleged that “Applicant’s claim recites first and second circuitry that operates an antenna in different modes “substantially simultaneously.” As noted above, claim 1, in part, recites “a multi-antenna signal processing circuit situated in a first access point and adapted to: operate simultaneously with a first baseband processor, so that said first baseband processor handles data transmissions in a first mode between said first access point and a second access point under a first channel transmission condition, and said multi-antenna signal processor handles data transmissions in a second mode between said first access point and said second access point under a second channel transmission condition.” The simultaneous processing recited in the pending claims is between the first baseband processor and the multi-antenna signal processor, wherein the first baseband processor “handles data transmissions in a first mode between said first access point and a second access point under a first channel transmission condition, and said multi-antenna signal processor handles data transmissions in a second mode between said first access point and said second access point under a second channel transmission condition.”

Applicants note that multi-antenna signal processor, recited in the pending claims, is not the same as a group of antennas, as the Office Action seems to allege. Simply because a processor is named a multi-antenna signal processor does not mean the processor is an antenna.

Furthermore, as previously noted, if one skilled in the art were to combine the teachings of Rudrapatna with Jia, one skilled in the art would modify the antenna elements of Jia to operate simultaneously. However, such modification would not result in the antenna elements of Jia operating simultaneously with the baseband processor element. Therefore, the combination of Jia and Rudrapatna fails to teach or suggest “a multi-antenna signal processing circuit situated in a first access point and adapted to: operate simultaneously with a first baseband processor, so that said first baseband processor handles data transmissions in a first mode between said first access point and a second access point under a first channel transmission condition, and said multi-antenna signal processor handles data transmissions in a second mode between said first access point and said second access point under a second channel transmission condition,” as recited in claim 1, upon which claims 2-9 depend.

Independent claim 1, in part, also recites receiving “M independent RF modulated input signals from said second access point when the second channel transmission mode exists between the first access point and said second access point” and processing “said M independent RF modulated input signals using a channel mixing matrix to extract N independent data signals transmitted by said second access point, wherein said multi-antenna signal processing circuit operates selectively with a first baseband processor to demodulate RF signals received in a channel from a second access point.” The Office Action acknowledged that Jia also does not teach these features.

The Office Action alleged that Walton cures these deficiencies of Jia. Although paragraph 218 of Walton discloses that transmitted uplink signals are received by antennas, demodulated by demodulators and processed by an RX spatial processor and RX data processor, there is no teaching or suggestion in Walton of receiving “M independent RF modulated input signals from said second access point when the second channel transmission mode exists between the first access point and said second access point,” as recited in claim 1. (Underlining added.

In the Response to Arguments section, the Office Action alleged that because Walton discloses that different transmission modes are associated with different numbers of antennas and different spatial processing is used at the transmitter and receiver ends, Walton teaches the receiving element noted above. Because there is no disclosure in Walton of the second transmission mode existing between the first and second access points, even if as alleged in the Office Action, Walton teaches that M independent RF modulation input signals are received, there is no teaching or suggestion in Walton that this receipt is “when the second channel transmission mode exists between the first access point and said second access point,” as recited in claim 1.

There is also no teaching or suggestion in Walton that the “multi-antenna signal processing circuit operates selectively with the first baseband processor to demodulate RF signals received in a channel from the second access point,” as recited in claim 1. In the Response to Arguments section, the Office Action alleged that it is inherent that there is circuitry in the access point to control the antennas so when signals are demodulated and processed, an element of the circuitry is performing these functions. Even if it is inherent that there is antenna control circuitry in the access point, as the Office Action alleged, one skilled in the art would not expect the antenna control circuitry to demodulate and process signals. Unlike what is alleged in the Office Action, one skilled in the art would expect the baseband processor to process/demodulate the received signal, as disclosed, for example, in Jia which was discussed above. Therefore, Applicants submit that one skilled in the art would not expect the antenna control circuitry to demodulate and process signals, as the Office Action alleged.

Furthermore, claim 1, in part, recites that the “multi-antenna signal processing circuit operates selectively with the first baseband processor to demodulate RF signals received in a channel from the second access point.” Such selective operation by the multi-antenna signal processing circuit with the first baseband processor would not be obvious to one skilled in the art.

Therefore, Applicant submits that the combination of Jia, Rudrapatna and Walton fails to teach or suggest each of the elements recited in claim 1. Each of claims 2-5, 8 and 9 depends on claim 1 and therefore incorporates all of the elements of claim 1, in addition to the further

elements recited in claims 2-5, 8 and 9. Therefore, Applicants respectfully request that this rejection of claims 1-5, 8 and 9 under 35 U.S.C. §103 be withdrawn.

Claims 6, 10, 17 and 18 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Jia and Rudrapatna in view of Walton, and in further view of U.S. Patent No. 7,126,926 to Bjorklund et al. (hereinafter “Bjorklund”). This rejection is respectfully traversed.

As outlined below, the combination of Bjorklund, Rudrapatna, Jia and Walton does not teach or suggest each of the elements of claims 6, 10, 17 and 18.

Similar to independent claim 1, independent claim 10, in part, recites “a first access point and adapted to: (a) operate simultaneously with a first baseband processor, so that said first baseband processor handles data transmissions in a first mode between said first access point and a second access point under a first channel transmission condition, and said multi-antenna signal processor handles data transmissions in a second mode between said first access point and said second access point under a second channel transmission condition.” As noted above, the combination of Rudrapatna, Jia and Walton does not teach or suggest these features.

Bjorklund also does not cure these deficiencies of Jia, Rudrapatna, and Walton, as outlined above. Specifically, Bjorklund also does not teach or suggest “a multi-antenna signal processing circuit situated in a first access point and adapted to: operate simultaneously with a first baseband processor ... the first baseband processor handles data transmissions in a first mode ... and said multi-antenna signal processor handles data transmissions in a second mode,” as recited in claims 1 and 10. Bjorklund also does not teach or suggest receiving “M independent RF modulated input signals from said second access point when the second channel transmission mode exists between the first access point and said second access point ... wherein said multi-antenna signal processing circuit operates with a first baseband processor to receive and transmit RF signals in a channel between said first access point and said second access point,” as recited in claims 1 and 10.

Each of claims 6, 10, 17 and 18 depends on claims 1 and 10 and therefore incorporates all of the elements of claims 1 and 10, in addition to the further elements recited in claims 6, 10, 17 and 18. Therefore, Applicant respectfully requests that this rejection of claims 6, 10, 17 and 18 under 35 U.S.C. §103 be withdrawn.

Claim 7 stands rejected under 35 U.S.C. §103(a) as being unpatentable over the combination of Jia and Rudrapatna in view of Walton, and in further view of U.S. Patent No. 7,006,464 to Gopalakrishnan et al. (hereinafter “Gopalakrishnan”).

Claims 11-13 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Jia, Rudrapatna and Walton in view of Bjorklund and further in view of U.S. Patent No. 7,046,651 to Terry (hereinafter “Terry”).

Claims 14-16 and 19 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Jia, Rudrapatna and Walton in view of Bjorklund and further in view of U.S. Patent Publication No. 2004/0219937 to Sugar et al. (hereinafter “Sugar”). These rejections are respectfully traversed.

Gopalakrishnan does not cure the deficiencies of Jia, Rudrapatna, and Walton, as noted above with respect to claim 1, upon which claim 7 depends.

Sugar and Terry do not cure the deficiencies of Jia, Rudrapatna, Walton and Bjorklund, as noted above with respect to claim 10, upon which claims 11-16 and 19 depend.

Therefore, Applicants respectfully request that the rejections of claims 7, 11-16 and 19 under 35 U.S.C. §103 be withdrawn.

Claim 20 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Jia in view of Walton and in further view of Sugar and in further view of Rudrapatna. This rejection is respectfully traversed.

As noted above, none of the cited references teaches or suggests “a radio frequency (RF) multi-antenna access point circuit comprising: a baseband processor circuit for handling data transmissions during a first operating mode in a channel between a first access point and a second access point; a multi-antenna signal processing circuit for handling data transmissions during a second operating mode in said channel, wherein the baseband processor is capable of operating substantially simultaneously with the multi-antenna signal processing circuit,” as recited in claim 20. Therefore, Applicant respectfully requests that this rejection of claim 20 under 35 U.S.C. §103 be withdrawn.

Claims 21, 22, 25, 29, 30, 33-35, 38 and 42 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Jia in view of Rudrapatna.

Claims 23, 24, 31, 32, 36 and 37 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Jia in view of Rudrapatna and in further view of Walton.

Claims 26, 27, 39 and 40 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Jia, in view of Rudrapatna, and in further view of Bjorklund.

These rejections are respectfully traversed.

As noted above, neither Jia, Rudrapatna, Walton nor Bjorklund teaches or suggests “a multi-antenna signal processing circuit situated in a first access point and adapted to: operate simultaneously with a first baseband processor ... the first baseband processor handles data transmissions in a first mode ... and said multi-antenna signal processor handles data transmissions in a second mode, wherein the baseband processor is capable of operating substantially simultaneously with the multi-antenna signal processing circuit,” as recited in independent claims 21, 34 and 35, upon which claims 22, 25, 29, 38 and 42 depend. Therefore, Applicants respectfully request that the rejections of claims 21-27, 29-40 and 42 under 35 U.S.C. §103 be withdrawn.

Claims 28 and 41 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Jia, in view of Rudrapatna, and in further view of U.S. Patent No. 7,046,651 to Terry (hereinafter “Terry”). This rejection is respectfully traversed.

As noted above, neither Jia, Rudrapatna nor Terry teaches or suggests “a multi-antenna signal processing circuit situated in a first access point and adapted to: operate simultaneously with a first baseband processor ... the first baseband processor handles data transmissions in a first mode ... and said multi-antenna signal processor handles data transmissions in a second mode, wherein the baseband processor is capable of operating substantially simultaneously with the multi-antenna signal processing circuit,” as recited in independent claims 21 and 35, upon which claims 28 and 41 depend. Therefore, Applicants respectfully request that this rejection of claims 28 and 41 under 35 U.S.C. §103 be withdrawn.

Claims 43 and 46 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Jia, in view of Sugar, and in further view of Rudrapatna. Claims 44 and 45 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Jia in view of Sugar, in view of Rudrapatna, and in further view of Walton. These rejections are respectfully traversed.

As noted above, neither Jia nor Sugar teaches or suggests “a multi-antenna signal processing circuit situated in a first access point and adapted to: operate simultaneously with a first baseband processor ... the first baseband processor handles data transmissions in a first mode ... and said multi-antenna signal processor handles data transmissions in a second mode, wherein the baseband processor is capable of operating substantially simultaneously with the multi-antenna signal processing circuit,” as recited in independent claim 43, upon which claims 44-46 depend. Therefore, Applicant respectfully requests that this rejection of claims 43-46 under 35 U.S.C. §103 be withdrawn.

Disclaimer

Applicants may not have presented all possible arguments or have refuted the characterizations of either the claims or the prior art as found in the Office Action. However, the lack of such arguments or refutations is not intended to act as a waiver of such arguments or as concurrence with such characterizations.

CONCLUSION

In view of the above, consideration and allowance are respectfully solicited.

In the event the Examiner believes an interview might serve in any way to advance the prosecution of this application, the undersigned is available at the telephone number noted below.

The Office is authorized to charge any necessary fees to Deposit Account No. 22-0185.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 22-0185, under Order No. 27592-00275-US6 from which the undersigned is authorized to draw.

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Respectfully submitted,

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